REMARKS

Claims 1, 4-12 are pending in the present application. Claims 5-12 are withdrawn from consideration. Claims 1 and 4 are herein amended. Claims 2-3 are herein cancelled. No new matter has been entered.

Objection to Information Disclosure Statement

Information Disclosure Statement was objected to because English translation was not submitted for Saito reference and Yokoyama reference (Office Action, page 2).

Accordingly, translations of these references are attached hereto. Because both Saito reference and Yokoyama reference were cited in the International Search Report as category "X" documents, these references should be considered by the examiner.

Also, it should be noted that the translations have been filed as an attachment because IDS cannot comply the requirements provided in 37 CFR 1.97. These references are neither first cited in any communication from a foreign patent office in a counterpart foreign application within three months prior to the filing of the information disclosure statement, nor known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.

Objection to Specification

The abstract of the disclosure is objected to because it is over the 150 word limit and longer than 1 paragraph.

By this amendment, the Abstract of the Disclosure has been amended to overcome this objection. Applicants respectfully request the Examiner to withdraw this objection.

Rejections under 35 USC §102(b)

Claims 1 and 2 were rejected under 35 U.S.C. 102(b) as being anticipated by Saito et al. ("Microstructure and Magnetostriction of Rapid-Solidified F3-1 5 at % Ga Alloy").

Claim 1 has been amended to recite "wherein the Fe-Ga magnetostrictive alloy retains the texture of the Fe-Ga alloy rapidly solidified material, and a magnetostriction of 170 to 230 ppm is obtained at room temperature by annealing after the sintering." The amendment is supported in the specification, for example at page 21, last 6 lines to page 22, line 4, page 25, lines 5-10, and claim 7.

Saito et al. is a reference which is mentioned in the present specification. Saito et al. discloses a strip material with a thickness of 80 μm which is made by rapid-solidification method (see 2. Experimental Procedures, paragraph 1). The present specification discusses the problems of such rapid-solidified material from page 6, last line to page 7, line 18.

The Examiner alleged that "Saito also teaches the Fe-Ga alloy having a large magnetostriction of 300 ppm (Introduction, par. 2)." However, Saito et al. discusses, at the cited

portion, Fe-Ga single crystals but not rapidly solidified material. The present specification discusses the problems of such single crystals at page 7, line 19 to page 8, line 1.

Saito et al. describes that "In comparison with as-spun ribbon sample, short-time (0.5 h) heat treated ribbon had stronger [100] oriented texture and exhibited larger magnetostriction of 140 ppm (x 10^{-6}) at 800 kA/m" (Saito et al., Abstract, also see Fig.10). Saito et al. does not teach or suggest Fe-Ga magnetostrictive alloy which is obtained by plasma sintering slices, a powder or chops comprising a Fe-Ga alloy rapidly solidified material. Also, Saito et al. does not teach or suggest that such a material has significantly higher magnetostriction than the rapidly solidified material.

Thus, claim 1 patentably distinguishes over Saito et al. Saito et al. Claim 2 has been cancelled making the rejection moot.

Rejections under 35 USC §103(a)

Claims 3 and 4 were rejected under 35 U.S.C. 103(a) as being obvious over Saito et al. ("Microstructure and Magnetostriction of Rapid-Solidified F3-15 at % Ga Alloy").

Claims 3 has been cancelled making the rejection moot.

Like claim 1, claim 4 recites "The rapidly solidified material consolidated into a bulk form for actuators and sensors, comprising a Fe-Ga magnetostrictive alloy which is obtained by plasma sintering slices, a powder or chops comprising a Fe-Ga alloy rapidly solidified material, the Fe-Ga alloy rapidly solidified material having a high temperature-side disordered bcc structure and a fine columnar texture by a liquid rapid solidification method, being in a

disordered to ordered transition composition range, and containing 15 to 23 atomic percent of Ga with respect to polycrystalline Fe."

As discussed above, Saito et al. does not teach or suggest Fe-Ga magnetostrictive alloy which is obtained by plasma sintering slices, a powder or chops comprising a Fe-Ga alloy rapidly solidified material. Also, Saito et al. does not teach or suggest that such a material has significantly higher magnetostriction than the rapidly solidified material.

For at least these reasons, claim 4 patentably distinguishes over Saito et al.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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Enclosures: English Translations for "Verification of the bulk solidification process based on the rapid solidification of shape memory alloy (SMA) actuator/sensor material and its characteristics" and
"Rapid - solidified bulk process and magnetostrictive properties of GALFENOL"

Verification of the bulk solidification process based on the rapid solidification of shape memory alloy (SMA) actuator/sensor material and its characteristics.

M.Yokoyama, Y.Furuya (Hirosaki Univ.)and M.Omori (IMR/Tohoku Univ..)

[Purpose] The new bulk type material invention process method by combining the rapid solidified unique crystal microstructure and spark plasma sintering(SPS) process was reported at
2005. Spring Meeting of JIM (March ,2005 Tokyo) as one of the novel hybrid-process to make bulk samples having the original and excellent material properties of the rapid-solidified ribbon and fibers.
This time, we take care of the process conditions to make more fine and homogeneous powder much more than previous presentation and sintering conditions (temperature hold time etc..) and study the performance of the SPS-ed bulk samples in comparison with former samples' data.

[Method] First, Ti5oNi5 o-XCux (X= 10%) ingot was made by ark-melting method and those alloys were used to fabricate the rapidly solidified elemental materials. i.e. 1) thin ribbon by single plane-roll method and 2) single triangle-tip roll spinning method. These thin ribbon and a fine fiber elemental materials were ball-milled toward fine powder to make bulky samples after SPS method. The sintering conditions such as pressure stress, temperature and holding time during sintering are examined experimentally, and the material properties of SPS-ed samples are studied systematically.

[Results] SMA Powder compact and SPS-ed bulky sample were checked about its thermoelastic transformation temperature points by using differential calorimeter of DSC, and change of the transformation points were recognized between sintered powder and laminated ribbons structures. Beside, in the powder metallurgy sample showed a dependency of the sintering atmosphere such as the degree of vacuum etc. at the time milling process before sintering. The details about those characteristic evaluations will be mentioned at the time of our presentation at the JIM meeting.

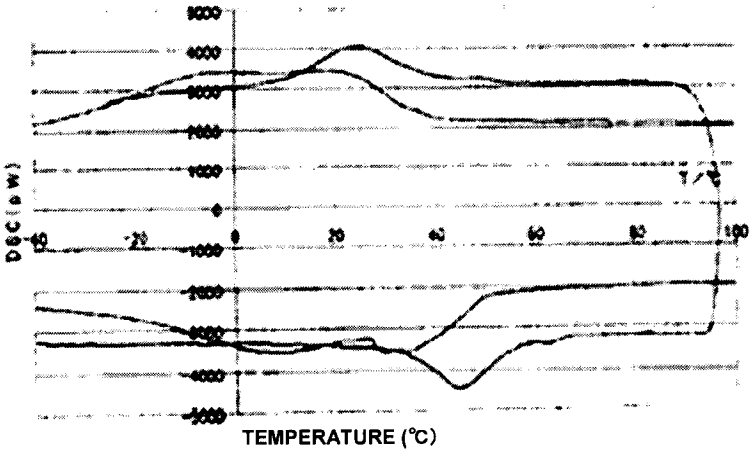

Fig.1 Changes of transformation temperatures of TiNiCi SMA s depending on milling time for making the raw powders

GALFENOL :272 Abstract

Rapid - solidified bulk process and magnetostrictive properties of GALFENOL

Hirosaki Univ. Chihiro Saito, Yasubumi Furuya, Teiko Okazaki
Tohoko Univ. Mamoru Omori, Akira Okubo, Yasuhisa Inoue

[**Propose**] The Authors have showed that rapid-solidified melt-spun Fe-Ga (GALFENOL) foils have strongly textured fine columnar grain parallel to thickness direction, and those exhibited larger magnetostriction than melted bulk's one when magnetic field applied to parallel to thickness. However, to achieve saturation magnetostriction in these foils, a large magnetic field is required because of large demagnetizing field, and the developed rapid-solidified foils are thought to be too small force to move the machines as for the application of these samples in smart material systems. In this study, we propose a novel material processing technique that can produce the bulk type solid-state actuator/sensor materials by combing the rapid-solidified foil and short time spark plasuma sintering/joining (SPS)methord.

[**Experiment**] Rapid-solidified Fe-17at%Ga foil(40~70 μm in thickness) was cut and then stacked to a few hundreds layers. The stacked layers are sintered/joined under electric pulse currents for a few minutes in the dies under compressive stresses at a constant high temperature. Crystal structure, magnetostriction under compressive stress and magnetic property for these bulky materials were measured.

[**Results**] The strong-textured microstructure in rapid-solidified foil remains in multi-layered bulk even after the SPS process. Magnetostriction for sintered Fe-Ga sample consisted of bcc layers are larger than that consisted of fcc layers. We report magnetostriction for rapid-solidified Fe-Ga foils, sintered layers and melted bulk.